What is claimed is:

1. A probe testing apparatus for testing an end shape of a contact probe brought into pressure contact with a contact pad on an integrated circuit, said apparatus comprising:

means for detecting a surface shape of at least one of said contact pad and said contact probe as three-dimensional data;

means for analyzing the surface shape through imaging; and

means for determining from the result of the analysis whether said contact probe is acceptable or defective.

2. The probe testing apparatus according to claim 1, further comprising:

pad scanning means for scanning the surface shape of said contact pad in pressure contact with said contact probe to read three-dimensional data of the surface shape;

part extracting means for differentiating the read surface shape to extract a multiplicity of flat parts;

reference generating means for complementing the multiplicity of extracted flat parts to generate a reference shape;

recess detecting means for subtracting said generated reference shape from the read surface shape to detect a plurality of recesses having a predetermined depth or more;

recess selecting means for selecting one from the plurality of detected recesses corresponding to reference information;

recess enlarging means for enlarging the selected recess outward by predetermined dimensions;

impression detecting means for subtracting said reference shape from the read surface shape at the position of the enlarged recess to detect an impression of said contact probe;

shape detecting means for detecting at least one of a depth, a position and a shape of the detected impression; and

probe determining means for determining from at least one of the detected depth, position and shape of the impression whether said contact probe is acceptable or defective.

3. The probe testing apparatus according to claim 1, further comprising:

pad scanning means for scanning the surface shape of said contact pad in pressure contact with said contact probe to read three-dimensional data of the surface shape;

surface averaging means for averaging the read surface shape;

part extracting means for differentiating the averaged surface shape to extract a multiplicity of flat parts;

reference generating means for complementing the multiplicity of extracted flat parts to generate a reference shape;

recess detecting means for subtracting the generated reference shape from the averaged surface shape to detect a plurality of recesses having a predetermined depth or more;

recess selecting means for selecting one from the plurality of detected recesses corresponding to reference information;

recess enlarging means for enlarging the selected recess

outward by predetermined dimensions;

impression detecting means for subtracting said reference shape from the read surface shape at the position of the enlarged recess to detect an impression of said contact probe;

shape detecting means for detecting at least one of a depth, a position and a shape of the detected impression; and

probe determining means for determining from at least one of the detected depth, position and shape of the impression whether said contact probe is acceptable or defective.

4. The probe testing apparatus according to claim 2, wherein:

said pad scanning means scans the shape of a surface of said contact pad in pressure contact with said contact probe from a Z-direction, said surface being parallel with an X-direction and a Y-direction; and

said recess selecting means comprises reference storing means for storing an X-direction length, a Y-direction length, and an area in the XY-directions as said reference information; and recess measuring means for detecting the X-direction length, the Y-direction length, and the area of each of said plurality of recesses as actually measured information; and recess comparing means for selecting a recess which has the actually measured information that presents the X-direction length, the Y-direction length, and the area exceeding their counterparts in said reference information, respectively.

5. The probe testing apparatus according to claim 3, wherein:

said pad scanning means scans the shape of a surface of said

contact pad in pressure contact with said contact probe from a Z-direction, said surface being parallel with an X-direction and a Y-direction; and

said recess selecting means comprises reference storing means for storing an X-direction length, a Y-direction length, and an area in the XY-directions as said reference information; and recess measuring means for detecting the X-direction length, the Y-direction length, and the area of each of said plurality of recesses as actually measured information; and recess comparing means for selecting a recess which has the actually measured information that presents the X-direction length, the Y-direction length, and the area exceeding their counterparts in said reference information, respectively.

6. The probe testing apparatus according to claim 1, further comprising:

probe imaging means for imaging the end shape of said contact probe from an axial direction to read three-dimensional data of the end shape;

cross-section detecting means for detecting a cross-sectional area of said contact probe at a predetermined position thereof from the imaged end shape; and

probe determining means for determining whether said contact probe is acceptable or defective depending on whether or not the detected cross-sectional area falls within a predetermined tolerance range.

7. The probe testing apparatus according to claim 1, further comprising:

probe imaging means for imaging the end shape of said contact probe from an axial direction to read three-dimensional data of the end shape;

peak detecting means for detecting a peak of said contact probe in the axial direction from the imaged end shape;

cross-section detecting means for detecting a cross-sectional area of said contact probe at a position retraced by a predetermined distance in the axial direction from the detected peak; and

probe determining means for determining whether said contact probe is acceptable or defective depending on whether or not the detected cross-sectional area falls within a predetermined tolerance range.

8. The probe testing apparatus according to claim 1, further comprising:

probe imaging means for imaging an end shape of said contact probe from the axial direction to read three-dimensional data of the end shape;

flat part detecting means for detecting a flat part perpendicular to the axial direction from the imaged end shape;

curvature detecting means for sequentially detecting curvatures along a contour of the detected flat part;

fragment detecting means for detecting a fragmentary length of the contour over which the detected curvature falls within a predetermined abnormal range; and

probe determining means for determining whether said contact probe is acceptable or defective depending on whether or not the ratio of a

total of the detected fragmentary lengths to the overall length of the contour falls within a predetermined tolerance range.

9. The probe testing apparatus according to claim 1, further comprising:

probe imaging means for imaging an end shape of said contact probe from the axial direction to read three-dimensional data of the end shape;

flat part detecting means for detecting a flat part perpendicular to the axial direction from the imaged end shape;

curvature detecting means for sequentially detecting curvatures along a contour of the detected flat part;

curvature averaging means for individually averaging a multiplicity of the detected curvatures;

fragment detecting means for detecting a fragmentary length of the contour over which the averaged curvature falls within a predetermined abnormal range; and

probe determining means for determining whether said contact probe is acceptable or defective depending on whether or not the ratio of the total of the detected fragmentary lengths to the overall length of the contour falls within a predetermined tolerance range.

10. The probe testing apparatus according to claim 1, further comprising:

probe imaging means for imaging an end shape of said contact probe from the axial direction to read three-dimensional data of the end

shape;

flat part detecting means for detecting a flat part perpendicular to the axial direction from the imaged end shape;

area detecting means for detecting the area of the detected flat part;

diameter detecting means for detecting a maximum diameter of the detected flat part;

area calculating means for calculating the area of the flat part from the detected diameter; and

probe determining means for determining whether said contact probe is acceptable or defective depending on whether or not the ratio of the detected area to the calculated area falls within a predetermined tolerance range.

11. The probe testing apparatus according to claim 1, further comprising:

probe imaging means for imaging an end shape of said contact probe from the axial direction to read three-dimensional data of the end shape;

peak detecting means for detecting a peak of said contact probe in the axial direction from the imaged end shape;

cross-section detecting means for detecting a cross-sectional area of said contact probe at a position retraced by a predetermined distance in the axial direction from the detected peak;

first determining means for determining whether said contact probe is acceptable or defective depending on whether or not the detected

cross-sectional area falls within a predetermined tolerance range;

flat part detecting means for detecting a flat part perpendicular to the axial direction from the imaged end shape;

curvature detecting means for sequentially detecting curvatures along a contour of the detected flat part;

fragment detecting means for detecting a fragmentary length of the contour over which the detected curvature falls within a predetermined abnormal range;

second determining means for determining whether said contact probe is acceptable or defective depending on whether or not the ratio of a total of the detected fragmentary lengths to the overall length of the contour falls within a predetermined tolerance range;

area detecting means for detecting the area of the detected flat part;

diameter detecting means for detecting a maximum diameter of the detected flat part;

area calculating means for calculating the area of the flat part from the detected diameter;

third determining means for determining whether said contact probe is acceptable or defective depending on whether or not the ratio of the detected area to the calculated area falls within a predetermined tolerance range; and

final determining means for definitely determining that said contact probe is defective when at least one of said first determining means, said second determining means, and said third determining means determines that said contact probe is defective.

12. The probe testing apparatus according to claim 1, further comprising:

probe imaging means for imaging an end shape of said contact probe from the axial direction to read three-dimensional data of the end shape;

peak detecting means for detecting a peak of said contact probe in the axial direction from the imaged end shape;

cross-section detecting means for detecting a cross-sectional area of said contact probe at a position retraced by a predetermined distance in the axial direction from the detected peak;

first determining means for determining whether said contact probe is acceptable or defective depending on whether or not the detected cross-sectional area falls within a predetermined tolerance range;

flat part detecting means for detecting a flat part perpendicular to the axial direction from the imaged end shape;

curvature detecting means for sequentially detecting curvatures along a contour of the detected flat part;

curvature averaging means for individually averaging a multiplicity of the detected curvature;

fragment detecting means for detecting a fragmentary length of the contour over which the averaged curvature falls within a predetermined abnormal range;

second determining means for determining whether said contact probe is acceptable or defective depending on whether or not the ratio of a total of the detected fragmentary lengths to the overall length of the

contour falls within a predetermined tolerance range;

area detecting means for detecting the area of the detected flat part;

diameter detecting means for detecting a maximum diameter of the detected flat part;

area calculating means for calculating the area of the flat part from the detected diameter;

third determining means for determining whether said contact probe is acceptable or defective depending on whether or not the ratio of the detected area to the calculated area falls within a predetermined tolerance range; and

final determining means for definitely determining that said contact probe is defective when at least one of said first determining means, said second determining means, and said third determining means determines that said contact probe is defective.

13. The probe testing apparatus according to claim 1, further comprising:

probe imaging means for imaging an end shape of said contact probe from the axial direction to read three-dimensional data of the end shape;

peak detecting means for detecting a peak of said contact probe in the axial direction from the imaged end shape;

cross-section detecting means for detecting a cross-sectional area of said contact probe at a position retraced by a predetermined distance in the axial direction from the detected peak;

first determining means for determining whether said contact probe is acceptable or defective depending on whether or not the detected cross-sectional area falls within a predetermined tolerance range;

flat part detecting means for detecting a flat part perpendicular to the axial direction from the imaged end shape;

curvature detecting means for sequentially detecting curvatures along a contour of the detected flat part;

fragment detecting means for detecting a fragmentary length of the contour over which the detected curvature falls within a predetermined abnormal range;

second determining means for determining whether said contact probe is acceptable or defective depending on whether or not the ratio of a total of the detected fragmentary lengths to the overall length of the contour falls within a predetermined tolerance range;

area detecting means for detecting the area of the detected flat part;

diameter detecting means for detecting a maximum diameter of the detected flat part;

area calculating means for calculating the area of the flat part from the detected diameter;

third determining means for determining whether said contact probe is acceptable or defective depending on whether or not the ratio of the detected area to the calculated area falls within a predetermined tolerance range; and

final determining means for definitely determining that said contact probe is defective when two of said first determining means, said

second determining means, and said third determining means determine that said contact probe is defective.

14. The probe testing apparatus according to claim 1, further comprising:

probe imaging means for imaging an end shape of said contact probe from the axial direction to read three-dimensional data of the end shape;

peak detecting means for detecting a peak of said contact probe in the axial direction from the imaged end shape;

cross-section detecting means for detecting a cross-sectional area of said contact probe at a position retraced by a predetermined distance in the axial direction from the detected peak;

first determining means for determining whether said contact probe is acceptable or defective depending on whether or not the detected cross-sectional area falls within a predetermined tolerance range;

flat part detecting means for detecting a flat part perpendicular to the axial direction from the imaged end shape;

curvature detecting means for sequentially detecting curvatures along a contour of the detected flat part;

curvature averaging means for individually averaging a multiplicity of the detected curvature;

fragment detecting means for detecting a fragmentary length of the contour over which the averaged curvature falls within a predetermined abnormal range;

second determining means for determining whether said

contact probe is acceptable or defective depending on whether or not the ratio of a total of the detected fragmentary lengths to the overall length of the contour falls within a predetermined tolerance range;

area detecting means for detecting the area of the detected flat part;

diameter detecting means for detecting a maximum diameter of the detected flat part;

area calculating means for calculating the area of the flat part from the detected diameter;

third determining means for determining whether said contact probe is acceptable or defective depending on whether or not the ratio of the detected area to the calculated area falls within a predetermined tolerance range; and

final determining means for definitely determining that said contact probe is defective when two of said first determining means, said second determining means, and said third determining means determine that said contact probe is defective.

15. The probe testing apparatus according to claim 1, further comprising:

probe imaging means for imaging an end shape of said contact probe from the axial direction to read three-dimensional data of the end shape;

peak detecting means for detecting a peak of said contact probe in the axial direction from the imaged end shape;

cross-section detecting means for detecting a cross-sectional

area of said contact probe at a position retraced by a predetermined distance in the axial direction from the detected peak;

first determining means for determining whether said contact probe is acceptable or defective depending on whether or not the detected cross-sectional area falls within a predetermined tolerance range;

flat part detecting means for detecting a flat part perpendicular to the axial direction from the imaged end shape;

curvature detecting means for sequentially detecting curvatures along a contour of the detected flat part;

fragment detecting means for detecting a fragmentary length of the contour over which the detected curvature falls within a predetermined abnormal range;

second determining means for determining whether said contact probe is acceptable or defective depending on whether or not the ratio of a total of the detected fragmentary lengths to the overall length of the contour falls within a predetermined tolerance range;

area detecting means for detecting the area of the detected flat part;

diameter detecting means for detecting a maximum diameter of the detected flat part;

area calculating means for calculating the area of the flat part from the detected diameter;

third determining means for determining whether said contact probe is acceptable or defective depending on whether or not the ratio of the detected area to the calculated area falls within a predetermined tolerance range; and

final determining means for definitely determining that said contact probe is defective when all of said first determining means, said second determining means, and said third determining means determine that said contact probe is defective.

16. The probe testing apparatus according to claim 1, further comprising:

probe imaging means for imaging an end shape of said contact probe from the axial direction to read three-dimensional data of the end shape;

peak detecting means for detecting a peak of said contact probe in the axial direction from the imaged end shape;

cross-section detecting means for detecting a cross-sectional area of said contact probe at a position retraced by a predetermined distance in the axial direction from the detected peak;

first determining means for determining whether said contact probe is acceptable or defective depending on whether or not the detected cross-sectional area falls within a predetermined tolerance range;

flat part detecting means for detecting a flat part perpendicular to the axial direction from the imaged end shape;

curvature detecting means for sequentially detecting curvatures along a contour of the detected flat part;

curvature averaging means for individually averaging a multiplicity of the detected curvature;

fragment detecting means for detecting a fragmentary length of the contour over which the averaged curvature falls within a predetermined

abnormal range;

second determining means for determining whether said contact probe is acceptable or defective depending on whether or not the ratio of a total of the detected fragmentary lengths to the overall length of the contour falls within a predetermined tolerance range;

area detecting means for detecting the area of the detected flat part;

diameter detecting means for detecting a maximum diameter of the detected flat part;

area calculating means for calculating the area of the flat part from the detected diameter;

third determining means for determining whether said contact probe is acceptable or defective depending on whether or not the ratio of the detected area to the calculated area falls within a predetermined tolerance range; and

final determining means for definitely determining that said contact probe is defective when two of said first determining means, said second determining means, and said third determining means determine that said contact probe is defective.

17. A probe testing method for use with a probe testing apparatus for testing the shape of a leading end of a contact probe which is brought into pressure contact with a contact pad on an integrated circuit, said method comprising the steps of:

detecting a surface shape of at least one of said contact pad and said contact probe as three-dimensional data;

analyzing the surface shape through imaging; and

determining from the result of the analysis whether said contact probe is acceptable or defective.

18. The probe testing method according to claim 17, further comprising:

a pad scanning step for scanning the surface shape of said contact pad in pressure contact with said contact probe to read three-dimensional data of the surface shape;

a part extracting step for differentiating the read surface shape to extract a multiplicity of flat parts;

a reference generating step for complementing the multiplicity of extracted flat parts to generate a reference shape;

a recess detecting step for subtracting said generated reference shape from the read surface shape to detect a plurality of recesses having a predetermined depth or more;

a recess selecting step for selecting one from the plurality of detected recesses corresponding to reference information;

a recess enlarging step for enlarging the selected recess outward by predetermined dimensions;

an impression detecting step for subtracting said reference shape from the read surface shape at the position of the enlarged recess to detect an impression of said contact probe;

a shape detecting step for detecting at least one of a depth, a position and a shape of the detected impression; and

a probe determining step for determining from at least one of

the detected depth, position and shape of the impression whether said contact probe is acceptable or defective.

19. The probe testing method according to claim 17, further comprising:

a pad scanning step for scanning the surface shape of said contact pad in pressure contact with said contact probe to read three-dimensional data of the surface shape;

a surface averaging step for averaging the read surface shape;

a part extracting step for differentiating the averaged surface shape to extract a multiplicity of flat parts;

a reference generating step for complementing the multiplicity of extracted flat parts to generate a reference shape;

a recess detecting step for subtracting said generated reference shape from the averaged surface shape to detect a plurality of recesses having a predetermined depth or more;

a recess selecting step for selecting one from the plurality of detected recesses corresponding to reference information;

a recess enlarging step for enlarging the selected recess outward by predetermined dimensions;

an impression detecting step for subtracting said reference shape from the read surface shape at the position of the enlarged recess to detect an impression of said contact probe;

a shape detecting step for detecting at least one of a depth, a position and a shape of the detected impression; and

a probe determining step for determining from at least one of

the detected depth, position and shape of the impression whether said contact probe is acceptable or defective.

20. The probe testing method according to claim 17, further comprising:

a probe imaging step for imaging the end shape of said contact probe from the axial direction to read three-dimensional data of the end shape;

a cross-section detecting step for detecting a cross-sectional area of said contact probe at a predetermined position from the imaged end shape; and

a probe determining step for determining whether said contact probe is acceptable or defective depending on the detected cross-sectional area falls within a predetermined tolerance range.

21. The probe testing method according to claim 17, further comprising:

a probe imaging step for imaging the end shape of said contact probe from an axial direction to read three-dimensional data of the end shape;

a peak detecting step for detecting a peak of said contact probe in the axial direction from the imaged end shape;

a cross-section detecting step for detecting a cross-sectional area of said contact probe at a position retraced by a predetermined distance in the axial direction from the detected peak; and

a probe determining step for determining whether said contact

probe is acceptable or defective depending on whether or not the detected cross-sectional area falls within a predetermined tolerance range.

22. The probe testing method according to claim 17, further comprising:

a probe imaging step for imaging an end shape of said contact probe from the axial direction to read three-dimensional data of the end shape;

a flat part detecting step for detecting a flat part perpendicular to the axial direction from the imaged end shape;

a curvature detecting step for sequentially detecting curvatures along a contour of the detected flat part;

a fragment detecting step for detecting a fragmentary length of the contour over which the detected curvature falls within a predetermined abnormal range; and

a probe determining step for determining whether said contact probe is acceptable or defective depending on whether or not the ratio of a total of the detected fragmentary lengths to the overall length of the contour falls within a predetermined tolerance range.

23. The probe testing method according to claim 17, further comprising:

a probe imaging step for imaging an end shape of said contact probe from the axial direction to read three-dimensional data of the end shape;

a flat part detecting step for detecting a flat part perpendicular

to the axial direction from the imaged end shape;

a curvature detecting step for sequentially detecting curvatures along a contour of the detected flat part;

a curvature averaging step for individually averaging a multiplicity of the detected curvatures;

a fragment detecting step for detecting a fragmentary length of the contour over which the averaged curvature falls within a predetermined abnormal range; and

a probe determining step for determining whether said contact probe is acceptable or defective depending on whether or not the ratio of the total of the detected fragmentary lengths to the overall length of the contour falls within a predetermined tolerance range.

24. The probe testing method according to claim 17, further comprising:

a probe imaging step for imaging an end shape of said contact probe from the axial direction to read three-dimensional data of the end shape;

a flat part detecting step for detecting a flat part perpendicular to the axial direction from the imaged end shape;

an area detecting step for detecting the area of the detected flat part;

a diameter detecting step for detecting a maximum diameter of the detected flat part;

an area calculating step for calculating the area of the flat part from the detected diameter; and

a probe determining step for determining whether said contact probe is acceptable or defective depending on whether or not the ratio of the detected area to the calculated area falls within a predetermined tolerance range.

25. A data processing apparatus associated with a probe testing apparatus for determining whether a contact probe is acceptable or defective when said contact probe is in pressure contact with a contact pad on an integrated circuit, said apparatus comprising:

means for applying a surface shape of at least one of said contact pad and said contact probe detected as three-dimensional data;

means for analyzing the surface shape through imaging; and

means for determining from the result of the analysis whether said contact probe is acceptable or defective.

26. The data processing apparatus according to claim 25, further comprising:

part extracting means for differentiating the read surface shape to extract a multiplicity of flat parts;

reference generating means for complementing the multiplicity of extracted flat parts to generate a reference shape;

recess detecting means for subtracting said generated reference shape from the read surface shape to detect a plurality of recesses having a predetermined depth or more;

recess selecting means for selecting one from the plurality of detected recesses corresponding to reference information;

recess enlarging means for enlarging the selected recess outward by predetermined dimensions;

impression detecting means for subtracting said reference shape from the read surface shape at the position of the enlarged recess to detect an impression of said contact probe;

shape detecting means for detecting at least one of a depth, a position and a shape of the detected impression; and

probe determining means for determining from at least one of the detected depth, position and shape of the impression whether said contact probe is acceptable or defective.

27. The data processing apparatus according to claim 25, further comprising:

surface averaging means for averaging the surface shape which is scanned from said contact pad as three-dimensional data;

part extracting means for differentiating the averaged surface shape to extract a multiplicity of flat parts;

reference generating means for complementing the multiplicity of extracted flat parts to generate a reference shape;

recess detecting means for subtracting said generated reference shape from the averaged surface shape to detect a plurality of recesses having a predetermined depth or more;

recess selecting means for selecting one from the plurality of detected recesses corresponding to reference information;

recess enlarging means for enlarging the selected recess outward by predetermined dimensions;

impression detecting means for subtracting said reference shape from the read surface shape at the position of the enlarged recess to detect an impression of said contact probe;

shape detecting means for detecting at least one of a depth, a position and a shape of the detected impression; and

probe determining means for determining from at least one of the detected depth, position and shape of the impression whether said contact probe is acceptable or defective.

28. The data processing apparatus according to claim 25, further comprising:

cross-section detecting means for detecting a cross-sectional area of said contact probe at a predetermined position thereof from the end shape imaged from said contact probe as three-dimensional data; and

probe determining means for determining whether said contact probe is acceptable or defective depending on whether or not the detected cross-sectional area falls within a predetermined tolerance range.

29. The data processing apparatus according to claim 25, further comprising:

peak detecting means for detecting a peak of said contact probe in the axial direction from the end shape imaged from said contact probe as three-dimensional data;

cross-section detecting means for detecting a cross-sectional area of said contact probe at a position retraced by a predetermined distance in the axial direction from the detected peak; and

probe determining means for determining whether said contact probe is acceptable or defective depending on whether or not the detected cross-sectional area falls within a predetermined tolerance range.

30. The data processing apparatus according to claim 25, further comprising:

flat part detecting means for detecting a flat part perpendicular to the axial direction from the end shape imaged from said contact probe as three-dimensional data;

curvature detecting means for sequentially detecting curvatures along a contour of the detected flat part;

fragment detecting means for detecting a fragmentary length of the contour over which the detected curvature falls within a predetermined abnormal range; and

probe determining means for determining whether said contact probe is acceptable or defective depending on whether or not the ratio of a total of the detected fragmentary lengths to the overall length of the contour falls within a predetermined tolerance range.

31. The data processing apparatus according to claim 25, further comprising:

flat part detecting means for detecting a flat part perpendicular to the axial direction from the end shape imaged from said contact probe as three-dimensional data;

curvature detecting means for sequentially detecting curvatures along a contour of the detected flat part;

curvature averaging means for individually averaging a multiplicity of the detected curvatures;

fragment detecting means for detecting a fragmentary length of the contour over which the averaged curvature falls within a predetermined abnormal range; and

probe determining means for determining whether said contact probe is acceptable or defective depending on whether or not the ratio of the total of the detected fragmentary lengths to the overall length of the contour falls within a predetermined tolerance range.

32. The data processing apparatus according to claim 25, further comprising:

flat part detecting means for detecting a flat part perpendicular to the axial direction from the end shape imaged from said contact probe as three-dimensional data;

area detecting means for detecting the area of the detected flat part;

diameter detecting means for detecting a maximum diameter of the detected flat part;

area calculating means for calculating the area of the flat part from the detected diameter; and

probe determining means for determining whether said contact probe is acceptable or defective depending on whether or not the ratio of the detected area to the calculated area falls within a predetermined tolerance range.

33. A data processing method for use with a data processing apparatus associated with a probe testing apparatus for determining whether a contact probe is acceptable or defective when said contact probe is in pressure contact with a contact pad on an integrated circuit, said method comprising the steps of:

applying a surface shape of at least one of said contact pad and said contact probe detected as three-dimensional data;

analyzing the surface shape through imaging; and

determining from the result of the analysis whether said contact probe is acceptable or defective.

34. The data processing method according to claim 33, further comprising:

a part extracting step for differentiating the read surface shape to extract a multiplicity of flat parts;

a reference generating step for complementing the multiplicity of extracted flat parts to generate a reference shape;

a recess detecting step for subtracting said generated reference shape from the read surface shape to detect a plurality of recesses having a predetermined depth or more;

a recess selecting step for selecting one from the plurality of detected recesses corresponding to reference information;

a recess enlarging step for enlarging the selected recess outward by predetermined dimensions;

an impression detecting step for subtracting said reference shape from the read surface shape at the position of the enlarged recess to

detect an impression of said contact probe;

a shape detecting step for detecting at least one of a depth, a position and a shape of the detected impression; and

a probe determining step for determining from at least one of the detected depth, position and shape of the impression whether said contact probe is acceptable or defective.

35. The data processing method according to claim 33, further comprising:

a surface averaging step for averaging the surface shape which is scanned from said contact pad as three-dimensional data;

a part extracting step for differentiating the averaged surface shape to extract a multiplicity of flat parts;

a reference generating step for complementing the multiplicity of extracted flat parts to generate a reference shape;

a recess detecting step for subtracting said generated reference shape from the averaged surface shape to detect a plurality of recesses having a predetermined depth or more;

a recess selecting step for selecting one from the plurality of detected recesses corresponding to reference information;

a recess enlarging step for enlarging the selected recess outward by predetermined dimensions;

an impression detecting step for subtracting said reference shape from the read surface shape at the position of the enlarged recess to detect an impression of said contact probe;

a shape detecting step for detecting at least one of a depth, a

position and a shape of the detected impression; and

a probe determining step for determining from at least one of the detected depth, position and shape of the impression whether said contact probe is acceptable or defective.

36. The data processing method according to claim 33, further comprising:

a cross-section detecting step for detecting a cross-sectional area of said contact probe at a predetermined position thereof from the end shape imaged from said contact probe as three-dimensional data; and

a probe determining step for determining whether said contact probe is acceptable or defective depending on whether or not the detected cross-sectional area falls within a predetermined tolerance range.

37. The data processing method according to claim 33, further comprising:

a peak detecting step for detecting a peak of said contact probe in the axial direction from the end shape imaged from said contact probe as three-dimensional data;

a cross-section detecting step for detecting a cross-sectional area of said contact probe at a position retraced by a predetermined distance in the axial direction from the detected peak; and

a probe determining step for determining whether said contact probe is acceptable or defective depending on whether or not the detected cross-sectional area falls within a predetermined tolerance range.

38. The data processing method according to claim 33, further comprising:

a flat part detecting step for detecting a flat part perpendicular to the axial direction from the end shape imaged from said contact probe as three-dimensional data;

a curvature detecting step for sequentially detecting curvatures along a contour of the detected flat part;

a fragment detecting step for detecting a fragmentary length of the contour over which the detected curvature falls within a predetermined abnormal range; and

a probe determining step for determining whether said contact probe is acceptable or defective depending on whether or not the ratio of a total of the detected fragmentary lengths to the overall length of the contour falls within a predetermined tolerance range.

39. The data processing method according to claim 33, further comprising:

a flat part detecting step for detecting a flat part perpendicular to the axial direction from the end shape imaged from said contact probe as three-dimensional data;

a curvature detecting step for sequentially detecting curvatures along a contour of the detected flat part;

a curvature averaging step for individually averaging a multiplicity of the detected curvatures;

a fragment detecting step for detecting a fragmentary length of the contour over which the averaged curvature falls within a predetermined

abnormal range; and

a probe determining step for determining whether said contact probe is acceptable or defective depending on whether or not the ratio of the total of the detected fragmentary lengths to the overall length of the contour falls within a predetermined tolerance range.

40. The data processing method according to claim 33, further comprising:

a flat part detecting step for detecting a flat part perpendicular to the axial direction from the end shape imaged from said contact probe as three-dimensional data;

an area detecting step for detecting the area of the detected flat part;

a diameter detecting step for detecting a maximum diameter of the detected flat part;

an area calculating step for calculating the area of the flat part from the detected diameter; and

a probe determining step for determining whether said contact probe is acceptable or defective depending on whether or not the ratio of the detected area to the calculated area falls within a predetermined tolerance range.

41. An information storage medium having a computer program stored thereon for a data processing apparatus associated with a probe testing apparatus for determining whether a contact probe is acceptable or defective when said contact probe is in pressure contact with a contact pad

on an integrated circuit, said computer program causing said data processing apparatus to execute the processing of:

applying a surface shape of at least one of said contact pad and said contact probe detected as three-dimensional data;

analyzing the surface shape through imaging; and

determining from the result of the analysis whether said contact probe is acceptable or defective.

42. The information storage medium according to claim 41, wherein said computer program further causes said data processing apparatus to execute:

part extraction processing for differentiating the read surface shape to extract a multiplicity of flat parts;

reference generation processing for complementing the multiplicity of extracted flat parts to generate a reference shape;

recess detection processing for subtracting said generated reference shape from the read surface shape to detect a plurality of recesses having a predetermined depth or more;

recess selection processing for selecting one from the plurality of detected recesses corresponding to reference information;

recess enlargement processing for enlarging the selected recess outward by predetermined dimensions;

impression detection processing for subtracting said reference shape from the read surface shape at the position of the enlarged recess to detect an impression of said contact probe;

shape detection processing for detecting at least one of a

depth, a position and a shape of the detected impression; and

probe determination processing for determining from at least one of the detected depth, position and shape of the impression whether said contact probe is acceptable or defective.

43. The information storage medium according to claim 41, wherein said computer program further causes said data processing apparatus to execute:

surface averaging processing for averaging the surface shape which is scanned from said contact pad as three-dimensional data;

part extraction processing for differentiating the averaged surface shape to extract a multiplicity of flat parts;

reference generation processing for complementing the multiplicity of extracted flat parts to generate a reference shape;

recess detection processing for subtracting said generated reference shape from the averaged surface shape to detect a plurality of recesses having a predetermined depth or more;

recess selection processing for selecting one from the plurality of detected recesses corresponding to reference information;

recess enlargement processing for enlarging the selected recess outward by predetermined dimensions;

impression detection processing for subtracting said reference shape from the read surface shape at the position of the enlarged recess to detect an impression of said contact probe;

shape detection processing for detecting at least one of a depth, a position and a shape of the detected impression; and

a probe determination processing for determining from at least one of the detected depth, position and shape of the impression whether said contact probe is acceptable or defective.

44. The information storage medium according to claim 41, wherein said computer program further causes said data processing apparatus to execute:

cross-section detection processing for detecting a cross-sectional area of said contact probe at a predetermined position thereof from the end shape imaged from said contact probe as three-dimensional data; and

probe determination processing for determining whether said contact probe is acceptable or defective depending on whether or not the detected cross-sectional area falls within a predetermined tolerance range.

45. The information storage medium according to claim 41, wherein said computer program further causes said data processing apparatus to execute:

peak detection processing for detecting a peak of said contact probe in the axial direction from the end shape imaged from said contact probe as three-dimensional data;

cross-section detection processing for detecting a cross-sectional area of said contact probe at a position retraced by a predetermined distance in the axial direction from the detected peak; and

probe determination processing for determining whether said contact probe is acceptable or defective depending on whether or not the

detected cross-sectional area falls within a predetermined tolerance range.

46. The information storage medium according to claim 41, wherein said computer program further causes said data processing apparatus to execute:

flat part detection processing for detecting a flat part perpendicular to the axial direction from the end shape imaged from said contact probe as three-dimensional data;

curvature detection processing for sequentially detecting curvatures along a contour of the detected flat part;

fragment detection processing for detecting a fragmentary length of the contour over which the detected curvature falls within a predetermined abnormal range; and

probe determination processing for determining whether said contact probe is acceptable or defective depending on whether or not the ratio of a total of the detected fragmentary lengths to the overall length of the contour falls within a predetermined tolerance range.

47. The information storage medium according to claim 41, wherein said computer program further causes said data processing apparatus to execute:

flat part detection processing for detecting a flat part perpendicular to the axial direction from the end shape imaged from said contact probe as three-dimensional data;

curvature detection processing for sequentially detecting curvatures along a contour of the detected flat part;

curvature averaging processing for individually averaging a multiplicity of the detected curvatures;

fragment detection processing for detecting a fragmentary length of the contour over which the averaged curvature falls within a predetermined abnormal range; and

probe determination processing for determining whether said contact probe is acceptable or defective depending on whether or not the ratio of the total of the detected fragmentary lengths to the overall length of the contour falls within a predetermined tolerance range.

48. The information storage medium according to claim 41, wherein said computer program further causes said data processing apparatus to execute:

flat part detection processing for detecting a flat part perpendicular to the axial direction from the end shape imaged from said contact probe as three-dimensional data;

area detection processing for detecting the area of the detected flat part;

diameter detection processing for detecting a maximum diameter of the detected flat part;

area calculation processing for calculating the area of the flat part from the detected diameter; and

probe determination processing for determining whether said contact probe is acceptable or defective depending on whether or not the ratio of the detected area to the calculated area falls within a predetermined tolerance range.